absorb its luminous particles, in a manner nearly similar to that which Dr. Herschel has supposed to take place with regard to the sun's atmosphere.

4thly. That as the variable star in Sobieski's Shield is occasionally diminished in appearance to the 6th or 7th magnitude, or even to a smaller magnitude, it appears that these luminous particles are but sparingly dispersed in its atmosphere.

5thly. He asks, may we not with much plausibility represent such luminous particles as spots, somewhat circular, and of no great extent.

6thly. That the principal bright parts are but slight patches, may, he says, be presumed, from the perpetual changes they undergo, and also from such changes being very visible to us.

7thly. He thinks we may obtain some idea of the relative situation or intervals between these bright parts, by the observations of the increase and decrease of brightness, as thereby the changes and times elapsed are pointed out.

Mr. Pigott says he has tried, practically, the effect of the above suppositions, by placing small white spots on a dark sphere, which sphere being turned round, represented the various changes as nearly as could be expected. Of these changes several views are given, accompanied with some observations on variable stars in general; in the course of which the author supposes it probable that many stars have lost their light, and that there are many others which have never shown a glimpse of brightness. He even asks, whether we may not suppose the number of these unenlightened stars equal to that of those endowed with light? If so, he thinks that by being collected together in clusters, as in the Milky Way, they must intercept all more distant rays; and if free from any intervening lights, must appear as dark spaces in the heavens, similar to what has been observed in the southern hemisphere.

Mr. Pigott, at the conclusion of his paper, says he thinks there are strong reasons to believe that the sun's luminous appearance has been at times considerably diminished; also, that he has little hesitation in conceiving it may, at some future period, be reduced to small patches.

An Account of some analytical Experiments on a mineral Production from Devonshire, consisting principally of Alumine and Water. By Humphry Davy, *Esq. F.R.S. Professor of Chemistry in the Royal Institution.* Read February 28, 1805. [*Phil. Trans.* 1805, *p.* 155.]

The mineral, of which an account is here given by Mr. Davy, was found many years ago by Dr. Wavel, in a quarry near Barnstaple. It was then considered as a kind of zeolite; but Mr. Hatchett, who visited the place in the year 1796, describes it as filling some cavities and veins in a rock of soft argillaceous schistus; and from that circumstance concluded, that it most probably did not belong to the

above-mentioned genus. Dr. Babington, from its physical characters, and from some experiments made on its solution in acids, ascertained that it was a mineral substance not yet described, and that it contained a considerable portion of aluminous earth.

This mineral is generally found in small hemispherical groups of crystals, composed of filaments radiating from a common centre, and inserted on the surface of the schistus: sometimes, however, it forms small veins of irregularly disposed prisms. It is of a white colour, having sometimes a tinge of gray, or of green; and, when beginning to be decomposed, of yellow. Its lustre is silky; it is generally almost opake, but sometimes semi-transparent. It is fragile; but its small fragments are so hard, as to be capable of scratching agate. It has no smell when breathed upon; it has not any taste, nor does it adhere to the tongue till it has been strongly ignited. It does not become electrical, or phosphorescent, by heat or friction; nor does it decrepitate before the blowpipe, but loses its hardness, and becomes quite opake. Its specific gravity, Mr. Davy thinks, does not exceed 270, water being considered as 100.

The white and semi-transparent specimens of this substance are soluble in the mineral acids, and also in fixed alkaline lixivia, without effervescence; but when coloured or opake specimens are exposed to alkaline lixivia, a small part remains undissolved.

A small transparent piece, by being exposed to the greatest heat of a forge, had its crystalline texture destroyed, and was rendered opake, but was not fused. It now had lost more than one-fourth of its weight, and adhered strongly to the tongue; neither water nor alcohol had any effect on this mineral. When exposed, in a glass tube, to a heat of from 212° to 600°, it gave out an elastic vapour, which, when condensed, was a clear fluid, having a slightly empyreumatic smell, but not differing in taste from pure water.

The solution of this substance in sulphuric acid produced crystals in thin plates, which had the properties of sulphate of alumine, and from which, when re-dissolved and mixed with potash, octahedral crystals of alum were obtained.

The solid matter precipitated from the solution of this substance in muriatic acid, was not acted upon by carbonate of ammonia, consequently it did not contain glucine or yttria.

Several experiments were made on the opake and coloured varieties of this mineral, from which it appears that the substances which cause these varieties, are calcareous earth, manganese, and oxide of iron.

Mr. Davy then proceeded to the analysis of the mineral. For this purpose he made use of the whitest and most transparent pieces he could obtain. The particulars of this analysis we shall pass over; and shall merely state that, according to its general results, 100 parts of the mineral contain, of alumine 70, of lime 1·4, of fluid 26·2, the loss amounting to 2·4; which loss Mr. Davy is inclined to attribute to some fluid remaining in the stone after the process of distillation,

having found, from several experiments, that a red heat is not sufficient to expell all the matter capable of being volatilized.

Mr. Davy then made some experiments to determine whether any portion of fixed alkali existed in this mineral, but no indications of such alkali could be observed.

The fluid obtained by distilling several different specimens of this mineral was similar in its properties; the only test of the presence of acid matter in it was litmus paper; and in some instances the effect upon this paper was scarcely perceptible. Mr. Davy made several experiments to determine the nature of the above acid matter, but without success.

It is, however, he says, evident that it is not any one of the known mineral acids: he is also disposed to believe, that it is not an essential component part of the mineral, but that, as well as the oxide of manganese, the oxide of iron, and the lime, it is only an accidental ingredient. Hence the mineral, when in a state of purity, must, he thinks, be considered as a chemical combination of about 30 parts of water, and 70 of alumine.

The diaspore, which has been examined by M. Vauquelin, loses 16 or 17 parts in the 100 by ignition, and contains nearly 80 parts of alumine, and 3 of oxide of iron. It is supposed by M. Vauquelin to be a compound of alumine and water. But its characters are very different from those of the mineral here described; and the nature of the part volatilized by heat has not yet been ascertained.

A mineral similar to that here treated of has been found near St. Austle in Cornwall; and Mr. Davy has been informed that, according to an analysis of it made by the Rev. William Gregor, it appears to consist of similar ingredients.

Dr. Babington has proposed to call this mineral by the name of Wavellite, from the gentleman who discovered it in Devonshire; but if a name founded upon its chemical composition should be preferred, Mr. Davy thinks it may be denominated Hydrargillite.

Experiments on Wootz. By Mr. David Mushet. *Communicated by the Right Hon. Sir* Joseph Banks, *K.B. P.R.S.* Read February 14, 1805. [*Phil. Trans.* 1805, *p.* 163.]

The fine cakes of the kind of steel called Wootz, which form the subject of the present paper, were delivered to Mr. Mushet, for the purpose of examination, by Sir Joseph Banks. Mr. Mushet begins his account of them by giving a very minute description of the form, the grain, and every other external character of these cakes. This description cannot well be abridged, and is too long to be repeated. We shall therefore only say that Mr. Mushet states, as a general remark, that the grain and density of these cakes of wootz were uniformly homogeneous, and free from metallic iron towards the under or round surface, but that they were always the reverse towards the upper side, called by Mr. Mushet the feeder.

The appearances observed upon forging these cakes are then par-